



U.S. Army Research, Development and Engineering Command



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

ProtoCore
DoD M&S Conference
10 March 2008

Report Documentation Page

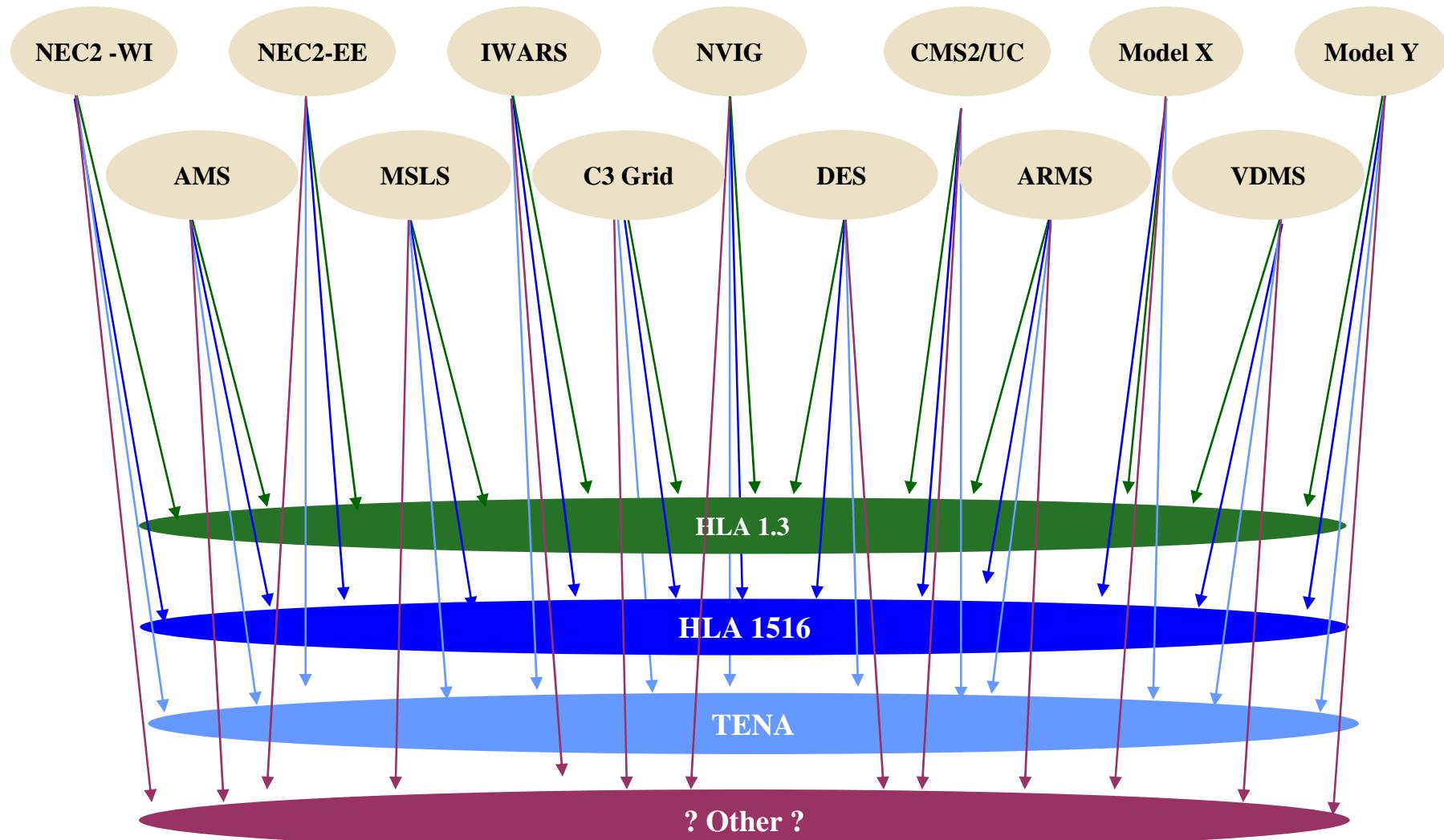
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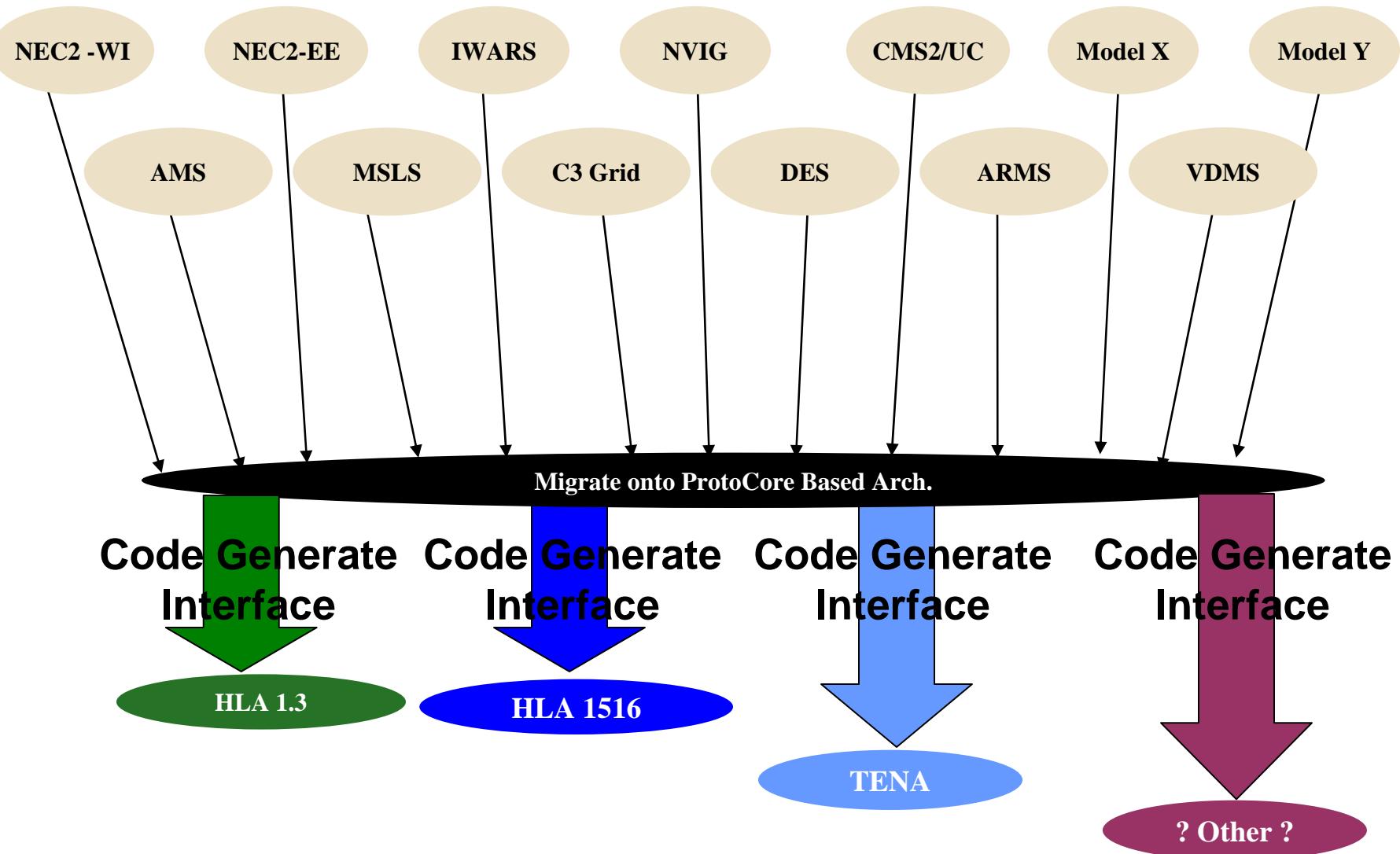
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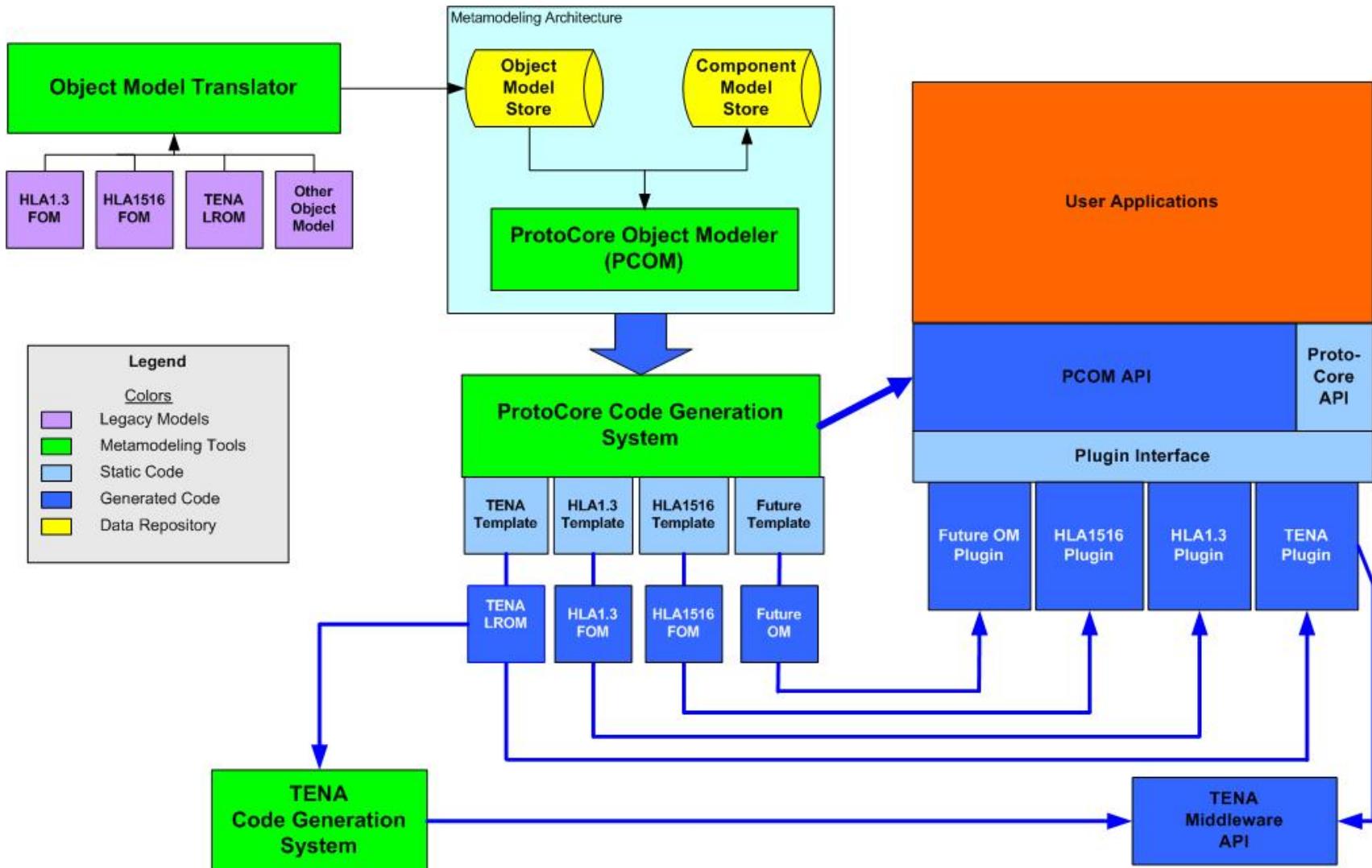
- Legacy middleware architectures, used in many simulation environments, do not make use of modern programming practices and can be cumbersome and error prone to use. e.g. HLA
- More and more middleware architectures are being used within the Army and DoD Modeling and Simulation for various purposes.
 - Existing infrastructures continue to be used for legacy simulations which have invested a lot of resources developing and maturing that environment. Switching is difficult and expensive.
 - Middleware to be used for given exercises is unknown and often open to change.
 - The application developer potentially needs to be an expert user for all existing and emerging architectures: e.g. HLA 1.3, HLA 1516, TENA, DIS, OOS
- Application developers are spending more and more time porting applications between various middleware architectures to enable Live-Virtual-Constructive (L-V-C) experimentation.

Overview (cont.)





- Provide modern Object Oriented and type safe Application Programming Interface (API) to distributed simulation services
 - Provide automatic handling of menial tasks, such as data marshaling, required for some infrastructures.
 - Type safe API allows more errors to be caught at compile time rather than runtime.
- Provide mechanism to connect API to various network protocols in near-term and minimize work of moving applications between them
 - Code-Generate connectivity to protocols from a common Object Model
 - Plugin architecture used to allow single application binary to run over various protocols without modification.
- Leverage existing software investments and minimize impact
- Provide a forward path for legacy object models and component models into the future



- Application Portability
 - Able to be used with multiple different transport protocols
 - Plugins only a single application binary simplifying deployment
- Preservation of Object Model
 - Existing object models can be used with and migrated to newer transport protocols
- Existing tools and applications can be migrated to new transport protocols
 - Preserve capability of existing models
 - Preserve test cases and capability

- **Code Generator**

- Allows users to compile libraries for customized FOMs
- Allows users to create custom templates for generating specific applications from Object Model

- **Functionality**

- Simulation Management
- Object Management
- Interaction Management
- Synchronization Points
- DDM
- Multiple Encoding/Decoding Schemes

- **Current Plug-ins**

- HLA 1.3 Plug-in
- HLA 1516 Beta Plug-in (Dynamic Link Compatible (DLC) API)
- Prototype of TENA MW Plug-in

- **Java Bindings**

- Supports JDK (Java Development Kit) 1.5+

- **Functionality**
 - Improve dynamic DDM support
 - Remote Method Invocation
 - Time Management
 - Ownership Management
 - Object Model Agility
 - Object Model Translator
- **Modeling Architecture**
 - Enhance ProtoCore Meta-Model to reflect additional semantic information captured within MATREX SDD Information Architecture
 - Provide tools to translate existing object models
- **Plugins**
 - Complete the HLA 1516 plugin (completed – in verification)
 - Complete the TENA plugin (completed – in final testing)
 - SoSCOE and DIS plugin in design and planning stage

- Current

- RDECOM (RDEC's)
 - Aviation and Missile Research, Development and Engineering Center (AMRDEC)
 - Army Research Laboratory (ARL)
 - Natick Soldier Research, Development and Engineering Center (NSRDEC)
 - Tank and Automotive Research, Development and Engineering Center (TARDEC)
- Naval Research Laboratory (NRL)
 - OASES
- FCS/LSI
 - Mule
 - ANS
- ATEC
 - DCARS
 - OT-TES
 - STORM
 - IMASE
 - ExCIS FSA

- Future

- TRADOC
 - Battle Laboratory Collaborative Simulation Environment (BLCSE)
 - Mounted Maneuver Battlespace Lab (MMBL)
- ATEC
 - JANUS
- Additional RDEC (ARMS, MSLS)
 - Armament Research, Development and Engineering Center (ARDEC)

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MATREX IDE Website: <https://www.matrex.rdecom.army.mil>



BACKUP

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- API distributed in binaries within the MATREX Tools release
- User and programming documentation exists in HTML format in tools release. Documents are generated from comments in code to help ensure it is kept current
- Support reflector and bug database for user support